1. Below is a plot of the U.S. Treasury yield curve for Tuesday, January 17th.

![Treasury Yield Curve](image)

a. Based upon the extreme arbitrage theory (expectations hypothesis), what are predicted future interest rates (based upon “yesterday’s” yield curve)?

The extreme arbitrage theory states that the current long-term rates are averages of the current short-term rates and the expectations of future short-term rates. Since the yield curve is flat, the average of the current short-term and expected future short-term rates are the same—in other words the extreme arbitrage theory would predict no change in future short-term interest rates compared to those observed today.

b. Based upon the segmented markets theory, what are predicted future interest rates (based upon “yesterday’s” yield curve)?

The segmented markets hypothesis requires markets of bonds with different maturities to be completely unrelated. As such, the interest rate in one market has no impact on interest rates in other markets and cannot be used to forecast future interest rates.

c. Based upon the preferred habitat theory (liquidity premium theory), what are predicted future interest rates (based upon “yesterday’s” yield curve)?

Under the preferred habitat theory, investors are additionally compensated for holding longer term debt versus short term debt. A flat yield curve indicates that future expected short term interest rates are expected to fall. This occurs because the average of the two short term rates and the liquidity preference term must equal the long term rate. A positive liquidity preference term and equal short term and long term rates indicate that expected future short term rates must fall.

d. Using either theory, what is the market predicting for future interest rates compared to one year ago?

Under the extreme arbitrage theory, an upward sloping yield curve indicates that future short-term interest rates are expected to rise. Interestingly, today’s short term interest rates are higher than they were one year ago today.

Under the segmented markets hypothesis, no prediction can be made.

Under the preferred habitat theory, the slope of the yield curve matters. If one year ago the slope was steep enough, then one would predict higher short term interest rates. However, an upward sloping yield curve under this theory does not necessarily suggest higher future short term interest rates since the yield curve is also upward sloping due to the risk premium.
2. Risk premiums on corporate bonds are usually countercyclical (they decrease during business cycle expansions and increase during contractions). Why is this so?
During business expansion there is a widespread belief that business failure is less likely leading to lower estimates of default risk. As default risk falls, demand for corporate bonds rises and rises further for those that were perceived as highly risk (default risk on IBM is relatively low so demand for IBM bonds don’t change as much as does demand for another company that was perceived to be riskier). As demand for corporate bonds rise, the interest rates on those bonds fall and the difference between interest rates for them and for safe bonds gets smaller.

3. Assuming that the expectations theory is the correct theory of the term structure, calculate the interest rates in the term structure for maturities of one to five years, and plot the resulting yield curves for the following paths of one-year expected interest rates over the next five years:
a. 5\%, 6\%, 7\%, 6\%, 5\%.

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<th>Time to Maturity</th>
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4. What effect would reducing income tax rates have on the interest rates of municipal bonds? Would interest rates of Treasury securities be affected? If so, how?
Since individuals care about their after-tax profit from holding a bond, a reduction in tax rates will increase the after-tax profits. However, municipal bond holders are exempted from income tax on their bonds so a change in tax rates impacts only corporate bonds. Thus, relative to municipal bonds, a lower income tax rates makes corporate bonds more attractive. Demand for corporate bonds will increase and their interest rates will decline. At the same time, since
corporate bonds and municipal bonds are substitutes, as people buy more corporate bonds the
demand for municipal bonds will decrease lowering their price and raising their interest rate.
The end result will be that corporate bond rates will come closer to municipal bond rates
however a spread will continue to exist because 1) income taxes still exist and impact corporate
and not municipal bonds and 2) municipal bonds are likely safer investments than corporate
bonds.

5. Suppose your marginal federal income tax rate is 36 percent. What is your after-tax
return from holding a one-year corporate bond with a yield of 9 percent? What is your after-tax
return from holding a one-year municipal bond with a yield of 5 percent? How would you
decide which bond to hold?
After tax, the corporate bond will return \((1 - .36) \times 9\% = 5.76\%\). If bond purchasers are
sufficiently risk averse, then the 5.76% return on risky corporate bonds may still not compensate
them sufficiently to make these bonds attractive when they could receive a relatively safer 5%
return in municipal bonds.

6. Imagine that the typical bond purchaser has a utility function of the form \(U = \$^{2/3}\). This
bond purchaser is considering a one year corporate bond which is a discount bond with face
value of $1000. 95% of the time this corporation fulfills its commitment and pays this face
value. There is a 5% chance that the corporation fails and pays nothing to bond holders.

a. What is the highest price a typical bond purchaser would pay for the corporate bond? What is
its associated interest rate?
95% of the time a holder of the corporate bond will receive 100 utility and 5% of the time they
will receive 0 utility for an expected utility of 95. The value of 95 utility to this individual is
equal to \(95^{1.5} = \$925.25\) which would be the most this individual pays for a risk that 95% of the
time pays $1000 and 5% pays 0. Notice, the expected value of the bond is $950 so the difference
between $950 and $925.25 is the value to the individual to avoid the uncertainty associated with
the bond. If the corporate bond is purchased at $925.25 then the associate interest rate is 8.07%.

b. All of a sudden, the economy enters a recession and as a result, the market believes there is a
6% chance of corporate bond default. What happens to the price the typical purchaser would be
willing to pay for this bond? What happens to its interest rate? Compare this to part a and
comment.
The risk averse bond purchaser would now be willing to pay \(94^{1.5} = \$911.36\) for this bond, a
decline of about 1.5% from the $925.25, a significantly larger amount than the 1% decline in the
expected payout of the bond. This is a function of risk aversion. Risk averse individuals
penalize risky assets more than their expected value changes, as the risk increases. This provides
investment opportunities for less risk averse individuals as the bond in part b now looks
relatively more attractive than the bond in part a (especially if you are risk neutral or risk loving).